

New England Botanical Club – Minutes of the 1025th Meeting
2 March 2007

Karen Lombard, Recording Secretary

The 798th meeting of the New England Botanical Club, being the 1025th since its original organization, was held on Friday, March 2, 2007, in the lecture hall of the Fairchild Biochemistry Building at Harvard University, Divinity Avenue, Cambridge, MA. This was the 2007 Annual Meeting of the club and there were 30 members and guests in attendance. The slate of nominated officers for the coming year was voted in by the membership. Committee reports were presented by the Fernald Award, Library, Non-vascular Plant, and Vascular Plant Committees. Highlights included an agreement with Missouri Botanical Garden to put back issues of *Rhodora* from 1899-1977 on line at <http://www.botanicus.org/Bibliography.aspx?BibId=b13022520>, as well as an agreement with BioOne.2 to put issues starting in 2005 on line (<http://www.bioone.org/perlserv/?request=get-current-issue>). Half of the lichen collection has been curated by Elizabeth Kneiper, and 122 new sheets have been added to the vascular herbarium bringing our total to 253,592 specimens. The club is still working on merging the NEBC and Harvard collections.

Vice-President Robert Bertin introduced the night's speakers, Richard Primack and Abe Miller-Rushing of Boston University, who presented "Climate Change Comes to Thoreau's Concord: A Community Perspective." Miller-Rushing led off the presentation by discussing his Ph.D. research on phenological changes resulting from climate change in Concord. He mentioned that in Europe there is good historical data on species' phenology as naturalists have kept track of birds and plants for centuries. The United States lacks this tradition with the exception of the Boston area. He and Primack are using records from Concord to describe what is happening to species now in eastern Massachusetts from climate change. Henry David Thoreau attempted to make a phenological calendar using over 600 species of flowering plants, and several other naturalists have also collected good data in Concord over the centuries (including Edward Jarvis, Minot Pratt, Alfred Hosmer, and Richard Eaton). The Boston area is also a good place to do this study, as it has warmed significantly (4.5° F) in the last 150 years from both urbanization and global warming.

Using 32 common plant species, Miller-Rushing and Primack discovered that these species are flowering over a week earlier on average than 100 years ago. Not all species respond similarly to temperature, but earlier-flowering species tend to be most responsive to warming temperatures. January temperatures can also be a good indicator of flowering times in some species because in colder years, some species flowered later. One example is black birch, which flowers later in cold years due to freezing damage that causes a lack of conductivity (embolisms in the xylem). A closely related species, gray birch, does not suffer these problems and thus is less sensitive to January temperatures.

One of the implications of changes in timing of flowering is the potential for mismatches in time-sensitive relationships, such as pollinators and flowering, and insects and bird migrations. Short-distance bird migrants are arriving 1.3 days earlier per 1° C, but long-distance migrants are not coming earlier. Bird data collected in southeastern Massachusetts has shown that wood ducks are arriving earlier because of earlier ice outs. A Netherlands study showed a decline in the pied flycatcher populations because winter moth caterpillars were coming out earlier in response to earlier leaf out of its host tree, the English oak. Caterpillars were then not available for the flycatcher chicks when they hatched.

Miller-Rushing and Primack are also looking for other sources of data that would help show warming trends. Herbarium specimens that have flowering data are helpful, particularly records from the Arnold Arboretum, which tracks individual plants, as well as photos taken on the same date at the same locations many years apart. A striking example of a Lowell cemetery photo taken on two Memorial Days over 100 years apart shows no leaf out at the earlier date whereas leaves are out by Memorial Day now.

Primack continued the presentation by discussing the importance of getting citizen naturalists involved in collecting data. Miller-Rushing and Primack have launched a program, Nature's Calendar New England, which has the public keeping observations on easily recognizable flowers and birds. Primack also discussed the analysis of historical Concord data in more detail: he and Miller-Rushing have searched for many of the species recorded by earlier botanists in an attempt to compile an updated flora of Concord. Current observations have shown that 28% of species recorded by Thoreau are now extirpated and 32% are rare. Most were lost in the last 40-50 years, and some groups, such as orchids, are particularly vulnerable to loss (7 species instead of 21 formerly). Causes are likely succession, air pollution, invasive species, and habitat destruction and fragmentation. The high level of undeveloped land in Concord (37% protected and another 25% undeveloped) has not been adequate to avoid species loss. The researchers have also been able to record changes in plant species abundance due to the availability of qualitative abundance descriptions made by historical researchers. More species are declining than increasing in Concord, and most increasing species are invasive. One example of a formerly common species is pitcher plant (*Sarracenia purpurea*), which is now found only in one bog. The greatest concentrations of new species have been found in new habitats such as the Concord landfill or along Route 2, where increasing salt concentrations have increased the prevalence of salt marsh species.